For information, contact:

Scott Millhouse
Huntsville Center
Phone 256-895-1607

U.S. Army Engineering & Support Center, Huntsville
4820 University Square
Huntsville, Alabama 35816-1822
Fax 256-895-1602
http://www.hnd.usace.army.mil/oew/tech/techindx.html

geographic information system

Pulling it all together for a look underground

Through the combination of GIS applications and computer-aided drafting and design hardware and software, an array of integrated topographical, geophysical, and statistical capabilities can be applied to site analysis. Such data integration saved $250K on one project alone.

Data Integration GIS can store digital data from the following sources, many of them free:

- Satellite images
- Aerial photographs
- U.S. Geological Survey
- Defense Mapping Agency
- Historical maps and photos
- Site surface sweeps
- Geophysical analyses
- Any records, reports, or studies

Input from those sources becomes part of the GIS relational data base, comprised of multiple layers of site data. Not only can all the data collected from a specific site be easily stored for the Administrative Record, but data from all formerly used defense sites (FUDS) feeds into an ever-growing knowledge base.

Through its relational data base, GIS geographically references and associates disparate site data for display and analysis. For example, a CADD-created planimetric map of the current site can be superimposed over an historical aerial photograph in order to analyze site changes over time. Such analysis based on historical usage helps investigators determine areas of potential contamination.

Similarly, a CADD map of the site subdivided into working grids can be superimposed over a current aerial photograph. Project managers can then use grid coordinates to monitor the accuracy and efficiency of contractor surface sweeps. Anomalies found during such sweeps can then be stored in the GIS data base for display on maps and further analysis.

Reduction in Anomaly Excavations Although referencing and associating mixed data is important, GIS may prove more important in reducing anomaly excavations. Preliminary results such tests indicate that GIS technology may reduce anomaly excavations by 50 percent. The ultimate objective of GIS is to reduce needless excavations by 95 percent.

The basis for such confident predictions lies in the magnetic fields of objects found during surface sweeps. Metal-detecting instruments not only pinpoint the “x-y” coordinates for position; they also reveal another dimension outside of space—the “z” coordinates, or the values produced by an object’s magnetic field as represented by the instruments. Bricks, nails, soda cans, or bombshells each produce a different set of magnetic field values. Those values can lead to object identification. By using GIS to sort, compare, and match “z” values or parameters and apply mathematical formulas, geophysicists are learning to read the unique combination of values associated with a specific object or category of objects—somewhat like a fingerprint. The challenge is to gather enough data to make magnetic signature identification even more reliable. More parameters means deeper analysis and better accuracy.